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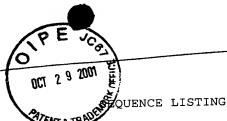<110>   HATTORI, NORIAKI
        MURAKAMI, SEIJI

<120>   LUCIFERASE AND A METHOD FOR DETECTING INTRACELLULAR ATP USING THE SAME

<130>   193582US-3524-7126-0 PCT

<140>   09/581241
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ttt tac cct att gaa gag gga tct gct gga gca caa ttg cgc aag tat        96
Phe Tyr Pro Ile Glu Glu Gly Ser Ala Gly Ala Gln Leu Arg Lys Tyr
            20                  25                  30

atg gat cga tat gca aaa ctt gga gca att gct ttt act aac gca ctt       144
Met Asp Arg Tyr Ala Lys Leu Gly Ala Ile Ala Phe Thr Asn Ala Leu
        35                  40                  45

acc ggt gtc gat tat acg tac gcc gaa tac tta gaa aaa tca tgc tgt       192
Thr Gly Val Asp Tyr Thr Tyr Ala Glu Tyr Leu Glu Lys Ser Cys Cys
        50                  55                  60

cta gga gag gct tta aag aat tat ggt ttg gtt gtt gat gga aga att       240
Leu Gly Glu Ala Leu Lys Asn Tyr Gly Leu Val Val Asp Gly Arg Ile
65                  70                  75                  80

gcg tta tgc agt gaa aac tgt gaa gaa ttc ttt att cct gta tta gcc       288
Ala Leu Cys Ser Glu Asn Cys Glu Glu Phe Phe Ile Pro Val Leu Ala
                85                  90                  95

ggt tta ttt ata ggt gtc ggt gtg gct cca act aat gag att tac act       336
Gly Leu Phe Ile Gly Val Gly Val Ala Pro Thr Asn Glu Ile Tyr Thr
            100                 105                 110

cta cgt gaa ttg gtt cac agt tta ggc atc tct aag cca aca att gta       384
Leu Arg Glu Leu Val His Ser Leu Gly Ile Ser Lys Pro Thr Ile Val
        115                 120                 125

ttt agt tct aaa aaa gga tta gat aaa gtt ata act gta caa aaa acg       432
Phe Ser Ser Lys Lys Gly Leu Asp Lys Val Ile Thr Val Gln Lys Thr
        130                 135                 140

gta act gct att aaa acc att gtt ata ttg gac agc aaa gtg gat tat       480
Val Thr Ala Ile Lys Thr Ile Val Ile Leu Asp Ser Lys Val Asp Tyr
145                 150                 155                 160

aga ggt tat caa tcc atg gac aac ttt att aaa aaa aac act cca caa       528
Arg Gly Tyr Gln Ser Met Asp Asn Phe Ile Lys Lys Asn Thr Pro Gln
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ggt ttc aaa gga tca agt ttt aaa act gta gaa gtt aac cgc aaa gaa       576
Gly Phe Lys Gly Ser Ser Phe Lys Thr Val Glu Val Asn Arg Lys Glu
            180                 185                 190

caa gtt gct ctt ata atg aac tct tcg ggt tca acc ggt ttg cca aaa       624
Gln Val Ala Leu Ile Met Asn Ser Ser Gly Ser Thr Gly Leu Pro Lys
        195                 200                 205

ggt gtg caa ctt act cat gaa aat ttg gtc act aga ttt tct cac gct       672
Gly Val Gln Leu Thr His Glu Asn Leu Val Thr Arg Phe Ser His Ala
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aga gat cca att tat gga aac caa gtt tca cca ggc acg gct att tta       720
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act gta gta cca ttc cat cat ggt ttt ggt atg ttt act act tta ggc   768
Thr Val Val Pro Phe His His Gly Phe Gly Met Phe Thr Thr Leu Gly
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tat cta act tgt ggt ttt cgt att gtc atg tta acg aaa ttt gac gaa   816
Tyr Leu Thr Cys Gly Phe Arg Ile Val Met Leu Thr Lys Phe Asp Glu
            260   265   270

gag act ttt tta aaa aca ctg caa gat tac aaa tgt tca agc gtt att   864
Glu Thr Phe Leu Lys Thr Leu Gln Asp Tyr Lys Cys Ser Ser Val Ile
            275   280   285

ctt gta ccg act ttg ttt gca att ctt aat aga agt gaa tta ctc gat   912
Leu Val Pro Thr Leu Phe Ala Ile Leu Asn Arg Ser Glu Leu Leu Asp
            290   295   300

aaa tat gat tta tca aat tta gtt gaa att gca tct ggc gga gca cct   960
Lys Tyr Asp Leu Ser Asn Leu Val Glu Ile Ala Ser Gly Gly Ala Pro
305   310   315   320

tta tct aaa gaa att ggt gaa gct gtt gct aga cgt ttt aat tta ccg   1008
Leu Ser Lys Glu Ile Gly Glu Ala Val Ala Arg Arg Phe Asn Leu Pro
               325   330   335

ggt gtt cgt caa ggc tat ggt tta aca gaa aca acc tct gca att att   1056
Gly Val Arg Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Ile Ile
            340   345   350

atc aca ccg gaa ggc gat gat aaa cca ggt gct tct ggc aaa gtt gtg   1104
Ile Thr Pro Glu Gly Asp Asp Lys Pro Gly Ala Ser Gly Lys Val Val
               355   360   365

cca tta ttt aaa gca aaa gtt atc gat ctt gat act aaa aaa act ttg   1152
Pro Leu Phe Lys Ala Lys Val Ile Asp Leu Asp Thr Lys Lys Thr Leu
            370   375   380

ggc ccg aac aga cgt gga gaa gtt tgt gta aag ggt cct atg ctt atg   1200
Gly Pro Asn Arg Arg Gly Glu Val Cys Val Lys Gly Pro Met Leu Met
385   390   395   400

aaa ggt tat gta gat aat cca gaa gca aca aga gaa atc ata gat gaa   1248
Lys Gly Tyr Val Asp Asn Pro Glu Ala Thr Arg Glu Ile Ile Asp Glu
               405   410   415

gaa ggt tgg ttg cac aca gga gat att ggg tat tac gat gaa gaa aaa   1296
Glu Gly Trp Leu His Thr Gly Asp Ile Gly Tyr Tyr Asp Glu Glu Lys
               420   425   430

cat ttc ttt atc gtg gat cgt ttg aag tct tta atc aaa tac aaa gga   1344
His Phe Phe Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly
            435   440   445

tat caa gta cca cct gct gaa tta gaa tct gtt ctt ttg caa cat cca   1392
Tyr Gln Val Pro Pro Ala Glu Leu Glu Ser Val Leu Leu Gln His Pro
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aat att ttt gat gcc ggc gtt gct ggc gtt cca gat cct ata gct ggt    1440
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gag ctt ccg gga gct gtt gtt gta ctt aag aaa gga aaa tct atg act    1488
Glu Leu Pro Gly Ala Val Val Val Leu Lys Lys Gly Lys Ser Met Thr
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gaa aaa gaa gta atg gat tac gtt gct agt caa gtt tca aat gca aaa    1536
Glu Lys Glu Val Met Asp Tyr Val Ala Ser Gln Val Ser Asn Ala Lys
            500                 505                 510

cgt ttg cgt ggt ggt gtc cgt ttt gtg gac gaa gta cct aaa ggt ctc    1584
Arg Leu Arg Gly Gly Val Arg Phe Val Asp Glu Val Pro Lys Gly Leu
        515                 520                 525

act ggt aaa att gac ggt aaa gca att aga gaa ata ctg aag aaa cca    1632
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Thr Gly Val Asp Tyr Thr Tyr Ala Glu Tyr Leu Glu Lys Ser Cys Cys
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Leu Gly Glu Ala Leu Lys Asn Tyr Gly Leu Val Val Asp Gly Arg Ile
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Ala Leu Cys Ser Glu Asn Cys Glu Glu Phe Phe Ile Pro Val Leu Ala
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Gly Leu Phe Ile Gly Val Gly Val Ala Pro Thr Asn Glu Ile Tyr Thr
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4

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Val Thr Ala Ile Lys Thr Ile Val Ile Leu Asp Ser Lys Val Asp Tyr
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Arg Gly Tyr Gln Ser Met Asp Asn Phe Ile Lys Lys Asn Thr Pro Gln
165 170 175

Gly Phe Lys Gly Ser Ser Phe Lys Thr Val Glu Val Asn Arg Lys Glu
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Gln Val Ala Leu Ile Met Asn Ser Ser Gly Ser Thr Gly Leu Pro Lys
195 200 205

Gly Val Gln Leu Thr His Glu Asn Leu Val Thr Arg Phe Ser His Ala
210 215 220

Arg Asp Pro Ile Tyr Gly Asn Gln Val Ser Pro Gly Thr Ala Ile Leu
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Thr Val Val Pro Phe His His Gly Phe Gly Met Phe Thr Thr Leu Gly
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Tyr Leu Thr Cys Gly Phe Arg Ile Val Met Leu Thr Lys Phe Asp Glu
260 265 270

Glu Thr Phe Leu Lys Thr Leu Gln Asp Tyr Lys Cys Ser Ser Val Ile
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Leu Val Pro Thr Leu Phe Ala Ile Leu Asn Arg Ser Glu Leu Leu Asp
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Lys Tyr Asp Leu Ser Asn Leu Val Glu Ile Ala Ser Gly Gly Ala Pro
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Leu Ser Lys Glu Ile Gly Glu Ala Val Ala Arg Arg Phe Asn Leu Pro
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Gly Val Arg Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Ile Ile
         340              345                 350

Ile Thr Pro Glu Gly Asp Asp Lys Pro Gly Ala Ser Gly Lys Val Val
         355              360                 365

Pro Leu Phe Lys Ala Lys Val Ile Asp Leu Asp Thr Lys Lys Thr Leu
         370              375                 380

Gly Pro Asn Arg Arg Gly Glu Val Cys Val Lys Gly Pro Met Leu Met
385              390                 395                 400

Lys Gly Tyr Val Asp Asn Pro Glu Ala Thr Arg Glu Ile Ile Asp Glu
             405                 410                 415

Glu Gly Trp Leu His Thr Gly Asp Ile Gly Tyr Tyr Asp Glu Glu Lys
         420              425                 430

His Phe Phe Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly
         435              440                 445

Tyr Gln Val Pro Pro Ala Glu Leu Glu Ser Val Leu Leu Gln His Pro
450              455                 460

Asn Ile Phe Asp Ala Gly Val Ala Gly Val Pro Asp Pro Ile Ala Gly
465              470                 475                 480

Glu Leu Pro Gly Ala Val Val Val Leu Lys Lys Gly Lys Ser Met Thr
             485                 490                 495

Glu Lys Glu Val Met Asp Tyr Val Ala Ser Gln Val Ser Asn Ala Lys
             500                 505                 510

Arg Leu Arg Gly Gly Val Arg Phe Val Asp Glu Val Pro Lys Gly Leu
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ttt tac cct att gaa gag gga tct gct gga gca caa ttg cgc aag tat   96
Phe Tyr Pro Ile Glu Glu Gly Ser Ala Gly Ala Gln Leu Arg Lys Tyr
            20   25   30

atg gat cga tat gca aaa ctt gga gca att gct ttt act aac gca ctt   144
Met Asp Arg Tyr Ala Lys Leu Gly Ala Ile Ala Phe Thr Asn Ala Leu
        35   40   45

acc ggt gtc gat tat acg tac gcc gaa tac tta gaa aaa tca tgc tgt   192
Thr Gly Val Asp Tyr Thr Tyr Ala Glu Tyr Leu Glu Lys Ser Cys Cys
    50   55   60

cta gga gag gct tta aag aat tat ggt ttg gtt gtt gat gga aga att   240
Leu Gly Glu Ala Leu Lys Asn Tyr Gly Leu Val Val Asp Gly Arg Ile
65   70   75   80

gcg tta tgc agt gaa aac tgt gaa gaa ttc ttt att cct gta tta gcc   288
Ala Leu Cys Ser Glu Asn Cys Glu Glu Phe Phe Ile Pro Val Leu Ala
                85   90   95

ggt tta ttt ata ggt gtc ggt gtg gct cca act aat gag att tac act   336
Gly Leu Phe Ile Gly Val Gly Val Ala Pro Thr Asn Glu Ile Tyr Thr
                100   105   110

cta cgt gaa ttg gtt cac agt tta ggc atc tct aag cca aca att gta   384
Leu Arg Glu Leu Val His Ser Leu Gly Ile Ser Lys Pro Thr Ile Val
            115   120   125

ttt agt tct aaa aaa gga tta gat aaa gtt ata act gta caa aaa acg   432
Phe Ser Ser Lys Lys Gly Leu Asp Lys Val Ile Thr Val Gln Lys Thr
        130   135   140

gta act gct att aaa acc att gtt ata ttg gac agc aaa gtg gat tat   480
Val Thr Ala Ile Lys Thr Ile Val Ile Leu Asp Ser Lys Val Asp Tyr
145   150   155   160

aga ggt tat caa tcc atg gac aac ttt att aaa aaa aac act cca caa   528
Arg Gly Tyr Gln Ser Met Asp Asn Phe Ile Lys Lys Asn Thr Pro Gln
                165   170   175

7

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ggt ttc aaa gga tca agt ttt aaa act gta gaa gtt aac cgc aaa gaa          576
Gly Phe Lys Gly Ser Ser Phe Lys Thr Val Glu Val Asn Arg Lys Glu
        180                 185                 190

caa gtt gct ctt ata atg aac tct tcg ggt tca acc ggt ttg cca aaa          624
Gln Val Ala Leu Ile Met Asn Ser Ser Gly Ser Thr Gly Leu Pro Lys
        195                 200                 205

ggt gtg caa ctt act cat gaa aat atc gtc act aga ttt tct cac gct          672
Gly Val Gln Leu Thr His Glu Asn Ile Val Thr Arg Phe Ser His Ala
        210                 215                 220

aga gat cca att tat gga aac caa gtt tca cca ggc acg gct att tta          720
Arg Asp Pro Ile Tyr Gly Asn Gln Val Ser Pro Gly Thr Ala Ile Leu
225                 230                 235                 240

act gta gta cca ttc cat cat ggt ttt ggt atg ttt act act tta ggc          768
Thr Val Val Pro Phe His His Gly Phe Gly Met Phe Thr Thr Leu Gly
                245                 250                 255

tat cta act tgt ggt ttt cgt att gtc atg tta acg aaa ttt gac gaa          816
Tyr Leu Thr Cys Gly Phe Arg Ile Val Met Leu Thr Lys Phe Asp Glu
                260                 265                 270

gag act ttt tta aaa aca ctg caa gat tac aaa tgt tca agc gtt att          864
Glu Thr Phe Leu Lys Thr Leu Gln Asp Tyr Lys Cys Ser Ser Val Ile
                275                 280                 285

ctt gta ccg act ttg ttt gca att ctt aat aga agt gaa tta ctc gat          912
Leu Val Pro Thr Leu Phe Ala Ile Leu Asn Arg Ser Glu Leu Leu Asp
        290                 295                 300

aaa tat gat tta tca aat tta gtt gaa att gca tct ggc gga gca cct          960
Lys Tyr Asp Leu Ser Asn Leu Val Glu Ile Ala Ser Gly Gly Ala Pro
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tta tct aaa gaa att ggt gaa gct gtt gct aga cgt ttt aat tta ccg          1008
Leu Ser Lys Glu Ile Gly Glu Ala Val Ala Arg Arg Phe Asn Leu Pro
                325                 330                 335

ggt gtt cgt caa ggc tat ggt tta aca gaa aca acc tct gca att att          1056
Gly Val Arg Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Ile Ile
                340                 345                 350

atc aca ccg gaa ggc gat gat aaa cca ggt gct tct ggc aaa gtt gtg          1104
Ile Thr Pro Glu Gly Asp Asp Lys Pro Gly Ala Ser Gly Lys Val Val
                355                 360                 365

cca tta ttt aaa gca aaa gtt atc gat ctt gat act aaa aaa act ttg          1152
Pro Leu Phe Lys Ala Lys Val Ile Asp Leu Asp Thr Lys Lys Thr Leu
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ggc ccg aac aga cgt gga gaa gtt tgt gta aag ggt cct atg ctt atg          1200
Gly Pro Asn Arg Arg Gly Glu Val Cys Val Lys Gly Pro Met Leu Met
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Glu Gly Trp Leu His Thr Gly Asp Ile Gly Tyr Tyr Asp Glu Glu Lys
            420                 425                 430

cat ttc ttt atc gtg gat cgt ttg aag tct tta atc aaa tac aaa gga      1344
His Phe Phe Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly
            435                 440                 445

tat caa gta cca cct gct gaa tta gaa tct gtt ctt ttg caa cat cca      1392
Tyr Gln Val Pro Pro Ala Glu Leu Glu Ser Val Leu Leu Gln His Pro
        450                 455                 460

aat att ttt gat gcc ggc gtt gct ggc gtt cca gat cct ata gct ggt      1440
Asn Ile Phe Asp Ala Gly Val Ala Gly Val Pro Asp Pro Ile Ala Gly
465                 470                 475                 480

gag ctt ccg gga gct gtt gtt gta ctt aag aaa gga aaa tct atg act      1488
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                485                 490                 495

gaa aaa gaa gta atg gat tac gtt gct agt caa gtt tca aat gca aaa      1536
Glu Lys Glu Val Met Asp Tyr Val Ala Ser Gln Val Ser Asn Ala Lys
                500                 505                 510

cgt ttg cgt ggt ggt gtc cgt ttt gtg gac gaa gta cct aaa ggt ctc      1584
Arg Leu Arg Gly Gly Val Arg Phe Val Asp Glu Val Pro Lys Gly Leu
            515                 520                 525

act ggt aaa att gac ggt aaa gca att aga gaa ata ctg aag aaa cca      1632
Thr Gly Lys Ile Asp Gly Lys Ala Ile Arg Glu Ile Leu Lys Lys Pro
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Phe Ser Ser Lys Lys Gly Leu Asp Lys Val Ile Thr Val Gln Lys Thr
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Val Thr Ala Ile Lys Thr Ile Val Ile Leu Asp Ser Lys Val Asp Tyr
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Arg Gly Tyr Gln Ser Met Asp Asn Phe Ile Lys Lys Asn Thr Pro Gln
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Gln Val Ala Leu Ile Met Asn Ser Ser Gly Ser Thr Gly Leu Pro Lys
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Gly Val Gln Leu Thr His Glu Asn Ile Val Thr Arg Phe Ser His Ala
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Arg Asp Pro Ile Tyr Gly Asn Gln Val Ser Pro Gly Thr Ala Ile Leu
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Tyr Leu Thr Cys Gly Phe Arg Ile Val Met Leu Thr Lys Phe Asp Glu
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Glu Thr Phe Leu Lys Thr Leu Gln Asp Tyr Lys Cys Ser Ser Val Ile
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Leu Val Pro Thr Leu Phe Ala Ile Leu Asn Arg Ser Glu Leu Leu Asp
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Lys Tyr Asp Leu Ser Asn Leu Val Glu Ile Ala Ser Gly Gly Ala Pro
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Leu Ser Lys Glu Ile Gly Glu Ala Val Ala Arg Arg Phe Asn Leu Pro
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Ile Thr Pro Glu Gly Asp Asp Lys Pro Gly Ala Ser Gly Lys Val Val
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Pro Leu Phe Lys Ala Lys Val Ile Asp Leu Asp Thr Lys Lys Thr Leu
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Gly Pro Asn Arg Arg Gly Glu Val Cys Val Lys Gly Pro Met Leu Met
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Lys Gly Tyr Val Asp Asn Pro Glu Ala Thr Arg Glu Ile Ile Asp Glu
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Glu Gly Trp Leu His Thr Gly Asp Ile Gly Tyr Tyr Asp Glu Glu Lys
420   425   430

His Phe Phe Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly
435   440   445

Tyr Gln Val Pro Pro Ala Glu Leu Glu Ser Val Leu Leu Gln His Pro
450   455   460

Asn Ile Phe Asp Ala Gly Val Ala Gly Val Pro Asp Pro Ile Ala Gly
465   470   475   480

Glu Leu Pro Gly Ala Val Val Val Leu Lys Lys Gly Lys Ser Met Thr
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11

Glu Lys Glu Val Met Asp Tyr Val Ala Ser Gln Val Ser Asn Ala Lys
            500   505   510

Arg Leu Arg Gly Gly Val Arg Phe Val Asp Glu Val Pro Lys Gly Leu
            515   520   525

Thr Gly Lys Ile Asp Gly Lys Ala Ile Arg Glu Ile Leu Lys Lys Pro
            530   535   540

Val Ala Lys Met
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